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GGSIPU mathmatics 2014

1. For integers m,n,s ≥ 0 $\sum_k^{m-r+8} C_k{}^{n+r-s} C_{n-k}{}^{r+k} C_{m+n}$ is equal to

 (a) 0 (b) ${}^nC_m\ {}^sC_®$

 (c) ${}^rC_m\ {}^sC_n$ (d) ${}^sC_n\ {}^mC_r$

2. $\lim_{x\to\infty} \sin x$ is equal to

 (a) 0

 (b) ã

 (c) exists is finite and non-zero

 (d) Does not exist

3. If x = a+b, y = aμ+bμ^2,z = aμ^2+ bμ, then xyz equals to (where,μ is the cube root of unity)

 (a) a+b (b) a^2+b^2

 (c) a^3+b^3 (d) a^4+b^4

4. $\lim_{n\to\infty}\left(\frac{2n^3}{2n^2+3}+\frac{1-5n^2}{5n+1}\right)$ is equal to

 (a) 0 (b) 1

 (c) 1/5 (d) ã

5. $\lim_{x\to\frac{\pi}{6}}\frac{\sin\left(x-\frac{\pi}{6}\right)}{\sqrt{3-2\cos x}}$ is equal to

 (a) 0 (b) $\frac{1}{(\sqrt{3}-2)}$

 (c) 1 (d) ã

6. $\lim_{x\to\infty}\left(\frac{2x^2+3}{2x^2+5}\right)^{8^{x^2}+3}$ is equal to

 (a) 0 (b) 1

 (c) e^8 (d) e^{-8}

7. For y = $\frac{x}{x^2-1}$, $\frac{d^n y}{dx^n}$ is equal to

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(a) $\frac{n!}{2}[\frac{1}{(x-1)^n}+\frac{1}{(x-1)^n}]$

(b) $\frac{(-1)^n n!}{2}[\frac{1}{(x+1)^n}-\frac{1}{(x-1)^n}]$

(c) $\frac{n!}{2}[\frac{1}{(x+1)^{n+1}}-\frac{1}{(x-1)^{n+1}}]$

(d) $\frac{(-1)^n n!}{2}[\frac{1}{(x+1)^{n+1}}-\frac{1}{(x-1)^{n+1}}]$

8. Find the slope of the normal to the curve $4x^3+6x^2-5xy-8y^2+9x+14 = 0$ T the point (-2,3).

(a) ∞ (b) 1

(c) $\frac{9}{2}$ (d) $\frac{2}{9}$

9. $\lim_{x\to 0}\frac{\sin 3x^2}{Ln\cos(2x^2-x)}$ **is equal to**

(a) 0 (b) -6

(c) 1 (d) ã

10. $\int_{-\pi/2}^{\pi/2}\cos x \ln\left(\frac{1+x}{1-x}\right)dx$ **is equal to**

(a) 0 (b) $\frac{\pi^2}{4}\left(-1+\frac{\pi}{2}\right)$

(c) 1 (d) $\frac{\pi^2}{2}$

11. $\lim_{n\to\infty}\left(\frac{\sqrt[3]{n!}}{n}\right)$ **is equal to**

(a) 0 (b) 1

(c) -1 (d) e^{-1}

12. $\int_0^{\pi}\sqrt{\frac{1+\cos 2x}{2}}dx$ **equals to**

(a) 0 (b) 2 (c) 4 (d) -2

13. The quadrangle with the vertices A(-3,5,6), B(1,-5,7),C(8,-3,-1) and D(4,7,-2) is a

(a) square (b) rectangle

(c) parallelelogram (d) trapezoid

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14. $^0a^0 = ^0b^0 = 5$ and the angle between a and b is $\frac{\pi}{4}$, The area of the triangle constructed on the vectors a-2b and 3a+2b is

(a) 50 (b) $50\sqrt{2}$

(c) $\frac{50}{\sqrt{2}}$ (d) 100

15. In the triangle with vertices A(1,-1,2), B(5,-6,2) and C(1,3-1) find the altitude $n = ^0BD^0$.

(a) 5 (b) 10 (c) $5\sqrt{2}$ (d) $\frac{10}{\sqrt{2}}$

16. If $\frac{1}{b-a}+\frac{1}{b-c}=\frac{1}{a}+\frac{1}{c}$, then a,b and c are in

(a) AP (b) HP

(c) GP (d) Both (b) and (c)

17. Given lines

$L_1 : \frac{x}{-2}=\frac{y-1}{0}=\frac{z+2}{1}$

$L_2 : \frac{x+1}{0}=\frac{y+1}{2}=\frac{z-2}{-1}$

Find the distance between the given straight lines.

(a) 12 (b) $\frac{\sqrt{21}}{12}$ (c) $\frac{21}{\sqrt{12}}$ (d) $\frac{12}{\sqrt{21}}$

18. Compute the shortest distance between the circle $x^2+y^2-10x-14y-151 = 0$ and the point (-7,2).

(a) 0 (b) 1 (c) 2 (d) 4

19. On the ellipse $9x^2+25y^2 = 225$, find the point the distancefrom which to the our focus F_1 is four times the distance to the other focus F_2,

(a) $(-15,\sqrt{63})$ (b) $\left(\frac{-15}{4},\frac{\sqrt{63}}{2}\right)$

(c) $\left(\frac{-15}{4},\frac{\sqrt{63}}{4}\right)$ (d) $\left(\frac{-15}{2},\frac{\sqrt{63}}{2}\right)$

20. On the parabola $y^2 = 64x$, find the point nearest to the straight line 4x+3y-14 = 0.

(a) (-24,9) (b) (9,12)

(c) (-9,24) (d) (9,-24)

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21. The determinant $\begin{vmatrix} x & y & x+y \\ y & x+y & x \\ x+y & x & y \end{vmatrix}$ is divisible by

(a) x-y (b) x^2-y^2+xy

(c) x^2+xy+y^2 (d) x^2-xy+y^2

22. The curve $5x^2+12xy-22x-12y-19 = 0$ is

(a) ellipse (b) parabola

(c) hyperbola (d) parallel straight lines

23. The derivative of $y = x^{2^x}$ w.r.t. x is

(a) $x^{2^x}2^x\left(\frac{1}{x}+In\,x\,In\,2\right)$ (b) $x^{2^x}\left(\frac{1}{x}+In\,x\,In\,2\right)$

(c) $x^{2^x}2^x\left(\frac{1}{x}+In\,x\right)$ (d) $x^{2^x}2^x\left(\frac{1}{x}+\frac{In\,x}{In\,2}\right)$

24. $\lim_{x\to\frac{\pi}{2}}(\pi-2x)^{\cos x}$ is equal to

(a) 0 (b) 1 (c) e (d) e^{-1}

25. $\int_0^1 x\tan^{-1}x\,dx$ is equal to

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{4}+\frac{1}{2}$

(c) $\frac{\pi}{4}-\frac{1}{2}$ (d) $\frac{1}{2}$

26. $\int_0^{\pi/3}\frac{\cos\theta}{5-4\sin\theta}\,d\theta$ equal to

(a $\frac{1}{4}\log\left(\frac{5}{5+2\sqrt{3}}\right)$ (b) $\frac{1}{4}\log\left(\frac{5}{5-2\sqrt{3}}\right)$

(c) $\frac{1}{4}\log\left(\frac{5+2\sqrt{3}}{5}\right)$ (d) $\frac{1}{4}\log\left(\frac{5-2\sqrt{3}}{5}\right)$

27. $\int\frac{x\,dx}{(1+x)^{3/2}}$ is equals to

(a) $2\frac{(2+x)}{\sqrt{1+x}}+C$ (b) $\frac{(2+x)}{\sqrt{1+x}}+C$

(c) $\frac{3}{2}\frac{x}{\sqrt{1+x}}+C$ (d) $\frac{3}{2}\frac{(2+x)}{\sqrt{1+x}}+C$

28. $\int a^x dx$ is equal to

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(a) $\frac{a^x}{x\log a}$ + C (b) $a^x \log a$ + C

(c) $\frac{a^x}{\log a}$ + C (d) $\frac{xa^x}{\log a}$ + C

29. $\int_{-\pi}^{\pi}(\cos px - \sin qx)^2\,dx$, where p and q are integers, is equal to

(a) -® (b) 0

(c) ® (d) 2®

30. The solution of the differential equation $(x^2-y^2)dx + 2xy\,dy = 0$, is

(a) $x^2-y^2 = Cx$ (b) $x^2-y^2 = Cy$

(c) $x^2+y^2 = Cx$ (d) $x^2-y^2 = Cy$

31. The solution of the differential equation $\frac{d^2y}{dx^2} + 3y = -2x$ is

(a) $c_1\cos\sqrt{3x} + c_2\sin\sqrt{3x} \cdot \frac{2}{3}x^2$

(b) $c_1\cos\sqrt{3x} + c_2\sin\sqrt{3x} \cdot \frac{4}{5}$

(c) $c_1\cos\sqrt{3x} + c_2\sin\sqrt{3x} \cdot 2x^2 + \frac{4}{9}$

(d) $c_1\cos\sqrt{3x} + c_2\sin\sqrt{3x} \cdot \frac{2}{3}x^2 + \frac{4}{9}$

32. Angles A, B, C of a aABC are in AP and b:c = $\sqrt{3}+\sqrt{2}$, then the ĎA is given by

(a) 45^0 (b) 60^0

(c) 75^0 (d) 90^0

33. The angle between the vectors a = $\hat{i} + 2\hat{j} + 2\hat{k}$ and b = $\hat{i} - 2\hat{j} + 2\hat{k}$ is

(a) $\sin^{-1}(1/9)$ (b) $\cos^{-1}(8/9)$

(c) $\sin^{-1}(8/9)$ (d) $\cos^{-1}(1/9)$

34. The straight line r = $(\hat{i} - \hat{j} + \hat{k}) + a(2\hat{i} + \hat{j} - \hat{k})$ = 4 are

(a) perpendicular to each other

(b) parallel

(c) inclined at an angle 60^0

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(d) inclined at an angle 45^0

35. If two cards are drawn simultaneously from the same set, the probability that atleast one of them will be the ace of hearts is

(a) $\frac{1}{13}$ (b) $\frac{1}{26}$ (c) $\frac{1}{52}$ (d) $\frac{3}{13}$

36. In a class there are 10 boys and 8 girls. When 3 students are selected at random, the probability that 2 girls and 1 boy are selected is

(a) $\frac{35}{102}$ (b) $\frac{15}{102}$

(c) $\frac{55}{102}$ (d) $\frac{25}{102}$

37. If M and N are any two events, the probability that exactly one of them occurs is (for an event set A, the complement is A^0)

(a) P(M) + P(N) – 2P(M Ć N)

(b) P(M) + P(N) – P(M Ć N)

(c) $P(M^0) + P(N^0) – 2P(M^0 Ć N^0)$

(d) $P(M Ć N^0) + P(M^0 Ć N)$

38. If three squares are chosen an a chess board, the chance that they should be in a diagonal line is

(a) $\frac{7}{144}$ (b) $\frac{5}{744}$

(c) $\frac{7}{544}$ (d) $\frac{11}{744}$

39. Let A = $\begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$, then

(a) A^2+7A-5/ = 0 (b) A^2-7A+5/ = 0

(c) A^2+5A-7/ = 0 (d) A^2-5A+7/ = 0

40. $\int_0^1 \frac{dx}{1+x+x^2}$ is equal to

(a) $\frac{6\pi}{\sqrt{3}}$ (b) $\frac{\pi}{2\sqrt{3}}$ (c) $\frac{2\pi}{3\sqrt{3}}$ (d) $\frac{\pi}{3\sqrt{3}}$

41. A market research group conducted a survey of 1000 consumers and reported that 720 consumers like product. A and 420 consumers like product B. Then, the least number of consumers that must have liked both the products is

(a) 170 (b) 180 (c) 210 (d) 190

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42. The polar form of complex number z =

X	5	2	1	4	3
Y	5	8	4	2	10

$\frac{i-1}{\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}}$ is

(a) $\frac{1}{\sqrt{2}}\left(\cos\frac{3\pi}{12}+i\sin\frac{3\pi}{12}\right)$

(b) $\sqrt{2}\left(\cos\frac{5\pi}{12}+i\sin\frac{5\pi}{12}\right)$

(c) $\sqrt{2}\left(\cos\frac{7\pi}{12}+i\sin\frac{7\pi}{12}\right)$

(d) $\frac{1}{\sqrt{2}}\left(\cos\frac{5\pi}{12}+i\sin\frac{5\pi}{12}\right)$

43. The equation of the plane passing through the points (2,2,1), (9,3,6) and perpendicular to the plane 2x+6y+6z = 1 is

(a) 2x-4y+5z-9 = 0 (b) 3x+4y-z-5 = 0

(c) 3x+4y-5z-9 = 0 (d) x+4y-9z-3 = 0

44. The line of regression of y on x for the following data

Is given by

(a) Y+0.4x = 1 (b) y+0.5x = 5

(c) y+0.4x = 7 (d) y+1.4x = 7

45. The measure of the chord intercepted by circle $x^2+y^2 = 9$ and the line x-y+2 = 0 is

(a) $\sqrt{28}$ (b) $2\sqrt{5}$

(c) 7 (d) 5

46. $\tan^{-1}(\sqrt{3})-\cot^{-1}(-\sqrt{3})$ equals to

(a) 0 (b) $2\sqrt{3}$ (c) $-\frac{\pi}{2}$ (d) ®

47. The sum of the deviations of the variates from the arithmetic mean is always

(a) +1 (b) 0

(c) -1 (d) real number

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48. A single letter is selected at random from the word "PROBABILITY". The probability that it is a vowel is

(a) $\frac{8}{11}$ (b) $\frac{4}{11}$

(c) $\frac{2}{11}$ (d) $\frac{3}{11}$

49. An object is observed from three points A,B and C in the same horizontal line passing through the base of the object. The angle of elevation at B is twice and at C thrice that at A. If AB = a, BC = b, then the height of the object is

(a) $\frac{a}{2b}\sqrt{(a+b)(3b-a)}$

(b) $\frac{a}{2b}\sqrt{(a-b)(3b-a)}$

(c) $\frac{a}{2b}\sqrt{(a-b)(3b+a)}$

(d) $\frac{a}{2b}\sqrt{(a+b)(3b+a)}$

50. The angle between the lines whose direction ratios are (1,1,2), ($\sqrt{3}$ -1, -$\sqrt{3}$-1,4) is

(a) $\cos^{-1}\left(\frac{1}{65}\right)$ (b) $\frac{\pi}{6}$

(c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

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